Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

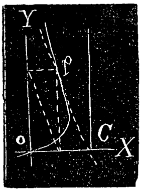
III. *In systems whose bases are less than unity, there is but one such logarithm and it is less than unity.*

Point of Inflection.—If we put

$$\frac{d^2x}{dy^2} = 0 \text{ we have } y = \frac{2}{lc},$$

which substituted in

$$\frac{dx}{dy} \text{ gives } \frac{dx}{dy} = \tan\omega = -c^{1-\frac{2}{lc}};$$



also in the value of $x = \frac{y}{c^{y-e}}$ and we have $-\frac{x}{y} = -c^{1-\frac{2}{lc}}.$

$$\therefore \tan\omega = \left(-\frac{x}{y}\right)$$

for point of inflection. That is, *the tangent to the curve at the point of inflection is parallel to a diagonal of the rectangle formed by the co-ordinates of the point of inflection and the co-ordinate axes.*

SOLUTIONS OF PROBLEMS IN NO. 3.

Solutions have been received as follows: S.J. Child solved 12; Theo. L. DeLand solved 11; Prof. A. B. Evans solved 11, 12, 13 and I4; Prof. J. M. Greenwood solved 13 and 14; Henry Gunder solved 11 and 12; William Hoover solved 12; Artemas Martin solved 11, 12, 13 and 14; L, Regan solved 12; Walter Siverly solved 11, 12, 13 and 14; S. W. Salmon solved 11 and 12; Prof. J. Scheffer solved 11 and 12; and E. B. Seitz solved 15.

11. "Borrowed a sum of money at 8 per cent. simple interest and loaned it out again at 5 per cent. compound interest; in what time will I gain the amount borrowed."

SOLUTION BY HENRY GUNDER, GREENVILLE, OHIO.

Let the sum borrowed be $1, and put t for the time to *gain* this sum. Then by the conditions we have $(1.05)^t = 2 + .08\,t$. By trial we find $t = 30$ years $+\,x$, a fraction of a year. To find this fraction we have the following equation: $(1.05)^{30} + (1.05)^{30} \times .05\,x = 4.40 + .08\,x$, from which we find $x = .5735$ years; hence the time is 30y. 6m. 26d.

12. "Given the base $A\,C$ of a triangle and the ratio of $A\,B$ to $B\,C$ to find the locus of the point B by Geometry."

SOLUTION BY ARTEMAS MARTIN, ERIE, PA.

Put $A\ C = a$ and the ratio of $A\ B$ to $B\ C$ as m to n; then

$$(A\ B)^2 : (B\ C)^2 :: m^2 : n^2.$$

Take the origin at A and let $A\ D = x$, $B\ D = y$; then $A\ B = \sqrt{x^2 + y^2}$ and $B\ C = \sqrt{(a - x)^2 + y^2}$;

$$\therefore x^2 + y^2 : (a - x)^2 + y^2 :: m^2 : n^2;$$

$$\text{whence } \left(x - \frac{m^2\,a}{m^2 - n^2}\right)^2 + y^2 = \left(\frac{m\,n\,a}{m^2 - n^2}\right)^2,$$

the equation to a circle whose radius is

$$\frac{m\,n\,a}{m^2 - n^2}.$$

---

13. "A body is projected at a given distance from the center of force with a given velocity, and in a direction perpendicular to that distance: When the force is repulsive and varies inversely as the cube of the distance, find the path of the body."

SOLUTION BY ASHER B. EVANS, LOCKPORT, N. Y.

Let r and θ be the angular co-ordinates of the body at the time t from the commencement of motion, the origin being the center of force. Let v be the velocity of projection, and let the prime radius be so taken that $r = a$, and $\theta = 0$ at the instant of projection.

From the usual equations of motion we have, μ being the intensity of the repulsive force at a unit's distance,

$$v^2 = r^2\left(\frac{d\theta}{dt}\right)^2 + \left(\frac{dr}{dt}\right)^2 = v_1^2 + \int_a^r \frac{2\,\mu\,d\,r}{r^3} = v_1^2 + \mu\left(\frac{1}{a^2} - \frac{1}{r^2}\right)$$

$$\text{and } r^2\left(\frac{d\theta}{dt}\right) = c.$$

Eliminating $d\,t$ between these equations, we find for the differential equation of the curve

$$\frac{c^2}{r^4}\left(\frac{dr}{d\theta}\right)^2 = v_1^2 + \frac{\mu}{a^2} - \frac{c^2 + \mu}{r^2}. \quad \ldots\ldots\ldots\ldots\ldots (1)$$

Put m^2 for $\dfrac{c^2 + \mu}{v_1^2 + \dfrac{\mu}{a^2}}$

and reduce (1) to the form

$$\frac{-c^2}{c^2 + \mu}\left\{d\left(\frac{m}{r}\right)\right\}^2 = \left\{1 - \left(\frac{m}{r}\right)^2\right\}\overline{d\theta}^2;$$

or $$\frac{d\left(\frac{m}{r}\right)}{\sqrt{1-\left(\frac{m}{r}\right)^2}} = \frac{-\sqrt{c^2+\mu}}{c}\,d\,\theta. \;\ldots\ldots\ldots\ldots\ldots(2)$$

Integrating (2) we find

$$c\left\{\sin^{-1}\left(\frac{m}{a}\right)-\sin^{-1}\left(\frac{m}{r}\right)\right\}=\theta\,\sqrt{c^2+\mu}$$

for the equation of the required path.

PROBLEMS.

20. It is required to circumscribe about a given parabola an isosceles triangle whose area shall be a minimum.—Communicated by A. W. Mason, Audenreid, Carbon County, Pa.

21. $ABCD$ is a quadrilateral; O, the intersection of the diagonals; P, Q, points in BD, AC, such that $QA = OC$ and $PB = OD$. Prove that the center of gravity of the quadrilateral coincides with that of the triangle OPQ.—Communicated by I. H. Turrell, Cumminsville, Ohio.

22. Show that the distance from a vertex of any plane triangle to the points where the opposite escribed circle touches the sides meeting at that vertex is constant and equal to half the sum of the sides of the triangle.—Communicated by Prof. C. M. Woodward, St. Louis, Mo.

23. If the brightness of the moon be equal to the brightness of the clouds by day, show that the light of an overcast day is to that of a full moon-lit night as $8(360)^2 : \pi^2$; the diameter of the moon being $30'$.—Communicated by Prof. Jas. Nooney, New Haven, Conn.

24. There are m labels, to be distributed by lot among m different articles. Required the probable amount of coincidence in two independent allotments.—Communicated by Prof. Pliny Earle Chase, Haverford College, Pa.

EDITORIAL NOTES.

We have been obliged, for want of room, to defer publishing the solutions of Nos. 14 and 15 to our next issue. We regret that our limited space will not permit us to publish the elegant solution of No. 12 by Prof. Scheffer, and of No. 13 by Messrs. Greenwood and Martin.

We publish in this number a translation of a letter received from Prof. Schiaparelli in reply to Prof. Hall's article, on Comets and Meteors, published in No. 2, which we think will interest most of our readers. In a note to the editor, Prof. Hall writes: "It is not difficult I think to reply to the two propositions laid down by Prof. Schiaparelli, but as he fully concedes that the solution given by Laplace is practically correct, I have nothing more to say."